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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,627	07/05/2006	Josef Aspelmayr	S3-03P04867	1314

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EXAMINER	
MCCALISTER, WILLIAM M	
ART UNIT	PAPER NUMBER
3753	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/567,627	ASPELMAYR ET AL.	
	Examiner	Art Unit	
	WILLIAM MCCALISTER	3753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/3/2006, 3/13/ 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's cancellation of claims 1-9 is acknowledged.

Claim Objections

1. Claim 19 is objected to because of the following informalities: line 5 should recite the word "each" only once; and it should end with a period. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 10 and 12-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schrod (DE 19 944 733, with US Patent 6,563,252 used as an English language equivalent thereof) in view of Takaku (US Patent 6,330,510).

With regard to claims 10 and 12, Schrod discloses a control method for a valve actuator, which comprises the following steps:

selectively charging and discharging the actuator to various charge states (see abstract), each corresponding to a valve position (see column 1 lines 51-54);

controlling the charging and discharging (see abstract) according to a specified control action (the determination of the desired position of the valve) corresponding to a specified setpoint value for the charge state (see description of comparison of actuator voltage to “threshold values” at column 5 lines 40-57);

during an idle time (see description of “hold phase” at column column 5 lines 54-57) between two consecutive chargings or dischargings (broadest reasonable interpretation includes “between charging and discharging”, see column 5 lines 54-57)

determining a controlled variable (see description of "actuator voltage" at column 5 lines 50-54) by measuring a voltage across the actuator which reflects the charge state of the actuator and/or a valve position (see column 5 lines 50-54); and

during an idle time between two consecutive chargings or dischargings, regulating the control action in dependence on the controlled variable (see column 5 lines 50-57, "recharging" of the actuator, and therefore necessarily regulation of the valve position, occurs during the hold phase, and is based on the measured actuator voltage).

Schrod does not disclose acquiring an external measured variable in the form of a pressure at the valve; or regulating the control action in dependence on the external measured variable during an idle time between two consecutive chargings or dischargings. However, Takaku teaches that it was known in the art at the time of invention to measure pressure at an injection valve (see pressure sensor 12) to electronically control actuation of the injection valve (see column 5 line 66 – column 6 line 17) based on pressure at the injection valve. To account for pressure at the valve in Schrod's determination of injection duration, it would have been obvious to one of ordinary skill in the art at the time of invention to supplement Schrod's method with Takaku's pressure measuring step, and to incorporate the results thereof into Schrod's regulating step.

With regard to claims 13 Schrod discloses the step of determining the control action for charging by a specified charging characteristic (see description of “possible forms and durations of the charging curve” at column 6, lines 17-29), determining the control action for discharging by a specified discharging characteristic see description of “possible forms and durations of the … discharge curve” at column 6, lines 17-29), wherein the charging characteristic and the discharging characteristic have a specified shape and steepness (all represented curves have a specified shape and steepness).

With regard to claims 14 and 15, Schrod discloses the control method to comprise the step of adjusting the steepness and shape of the charging characteristic as part of the regulating step. (See column 6 lines 17-21: “different forms … of the charging curve … can now be represented … as a function of … variations of the energy storage capacitor voltage". Note that different shape implies a different steepness, and that a different form implies a different shape).

With regard to claim 16, Schrod discloses the control method to further comprise determining the control action by the charging duration and/or the discharging duration (see description of “possible forms and durations of the charging curve” at column 6, lines 17-29), wherein the charging duration and/or the discharging duration are adjusted as part of the regulating step (see reference to “variations of the energy storage capacitor voltage”, at column 6 lines 17-21).

With regard to claim 17, Schrod discloses that it was known in the art at the time of invention that piezoelectric actuators are a well-known type of capacitive actuator usable with control systems such as that disclosed by Schrod (see Background of the Invention). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a piezoelectric actuator with Schrod's method of control. Schrod also discloses the injection valve to be an injection valve for an internal combustion engine (see column 1 lines 13-15).

With regard to claim 18, Schrod discloses the regulating step to be a closed-loop control step (the results of the recharging step are necessarily incorporated into the next iteration of an actuator voltage measurement during a hold phase).

With regard to claim 19, Takaku teaches a diagnosing system and control device for at least one valve actuator, the control device comprising comprising a pressure sensor at an injection valve (see pressure sensor 12), in order to electronically control operation of fuel injection valves (see column 5 line 66 - column 6 line 17) based on fuel pressure. Takaku does not disclose the remaining limitations as claimed.

With regard to claim 19, Schrod discloses a control device for at least one valve actuator, the control device comprising:

a controller (see control circuit, FIG 3) for controlled charging and/or discharging of the valve actuator to specified charge states (see abstract) corresponding to a

specified setpoint value (see description of comparison of actuator voltage to “threshold values” at column 5 lines 40-57), with each of the charge states corresponding to a valve position and said controller being characterized by a specified control action; and

a closed-loop (the results of the recharging step are necessarily incorporated into the next iteration of an actuator voltage measurement during a hold phase) control regulator (structure which necessarily must exist in order to carry out the function referenced in the analysis of claim 10, supra) connected to said controller for adapting the control action of said controller;

said regulator having an input connected to the actuator and/or to the valve in order to acquire a first controlled variable (inherent as the regulator obtains the actuator voltage, as set forth in the analysis of claim 10);

the controlled variable reflecting a charge state of the actuator and/or a valve position (see description of “actuator voltage” at column 5 lines 50-54); and

said regulator being configured to acquire the controlled variable discontinuously during idle times in each case and adjusting the control action discontinuously in idle times in each case (see description of operation during "hold phase" at column 5 lines 50-57);

Schrod does not disclose the regulator to have an input connected to at least one sensor for detecting a pressure at the valve defining a second controlled variable. However, Takaku teaches that it was known in the art at the time of invention to use a

pressure sensor at an injection valve (see pressure sensor 12) to measure and electronically control actuation of the injection valve (see column 5 line 66 – column 6 line 17) based on pressure at the injection valve. To account for pressure at the valve in Schrod's determination of injection duration, it would have been obvious to one of ordinary skill in the art at the time of invention to supplement Schrod's control device with Takaku's pressure sensor.

With regard to claim 20, Schrod and Takaku disclose the invention as claimed, but not the position of the regulator. However, at the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to superimpose the regulator onto the controller because applicant has not disclosed that this position provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with Shrod because the position of the regulator does not affect its function.

With regard to claim 21, Schrod discloses that it was known in the art at the time of invention that piezoelectric actuators are a well-known type of capacitive actuator usable with control systems such as that disclosed (see Background of the Invention). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a piezoelectric actuator with Schrod's method of control. Schrod also

discloses the injection valve to be an injection valve for an internal combustion engine (see column 1 lines 13-15).

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schrod and Takaku as applied to claim 10, and further in view of Shinogle (US Patent Application Publication 2001/0035465).

With regard to claim 11, Schrod and Takaku disclose the invention as claimed, but not the step of charging and discharging the actuator to charge states corresponding to a partially open valve position. However, Shinogle teaches that it was known in the art at the time of invention to charge and discharge piezoelectric actuators to charge states corresponding to partially open valve positions (see paragraph 16), in order to control mass flow without changing the operating pressure (see paragraph 2). To control mass flow through Schrod's valve without changing the operating pressure, it would have been obvious to one of ordinary skill in the art at the time of invention to charge and discharge Schrod's actuator to charge states corresponding to a partially open valve positions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM MCCALISTER whose telephone number is (571)270-1869. The examiner can normally be reached on M-R, 8-7.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Huson can be reached on 571-272-4887. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

William McCalister
Patent Examiner

/Stephen M. Hepperle/
Primary Examiner, Art Unit 3753

WMM
5/21/08